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| (51) International Patent Classification ⁵ : A61M 1/16, A61J 1/10, 1/14 B01F 13/08 | A1 | (11) International Publication Number: WO 93/18805 (43) International Publication Date: 30 September 1993 (30.09.93) |
| (21) International Application Number: PCT/SE93/00191 (22) International Filing Date: 5 March 1993 (05.03.93) (30) Priority data: 3/63695 19 March 1992 (19.03.92) JP (71) Applicant (for all designated States except US): GAMBRO KK [JP/JP]; P.O. Box 9, Koga, Shiga 520-34 (JP). (72) Inventors; and (75) Inventors/Applicants (for US only) : LARSSON, Åke [SE/ JP]; Nakamachi 5-11-21, Setagaya-ku, Tokyo 158 (JP). UNO, Kiyoshi [JP/JP]; Fukawaichiba 85, Konnan, Ko- ka-gun, Shiga 520-33 (JP). | | (74) Agent: BOBERG, Gunnar; Gambro AB, Patent Depart- ment, Box 10101, S-220 10 Lund (SE). (81) Designated States: US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> |
| (54) Title: A PROCESS FOR PREPARING A STOCK SOLUTION COMPOSITION FOR A MEDICAL TREATMENT, AND A SOFT BAG TO BE USED IN THE PREPARATION OF SAID STOCK SOLUTION COMPOSITION <div style="text-align: center;"> <p>The diagram shows a soft bag filled with a powder component. A stirrer is positioned inside the bag. An inlet for water is connected to the bag. The bag is placed on a platform above a stirrer-driving machine. The machine has a control panel with a power button, a dial, and a switch.</p> </div> | | |
| (57) Abstract <p>It is an object of the invention to provide a process for preparing stock solution compositions for especially blood dialysis, and also to provide soft bags employed in said process. Soft bags are prepared each of which contains powder components of a stock solution composition for preferably blood dialysis and preferably containing a stirrer. A predetermined amount of water or a water solution is supplied to the soft bag, and the contents of the soft bag are stirred by means of a magnetic field, so that the aimed stock solution composition can be prepared very easily in a short period of time.</p> | | |

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A PROCESS FOR PREPARING A STOCK SOLUTION COMPOSITION
FOR A MEDICAL TREATMENT, AND A SOFT BAG TO BE USED IN
THE PREPARATION OF SAID STOCK SOLUTION COMPOSITION

Industrial field of the invention

The present invention relates to a process for preparing a stock solution composition for a medical treatment such as dialysis, preferably hemodialysis, hemofiltration or hemodiafiltration, and a soft bag intended to be used for said preparation.

Preferably, the present invention relates to a process for preparing stock solution compositions for medical

use in the blood dialysis, particularly in the dialysis by artificial kidneys, and also relates to soft bags to be used for preparing such solution compositions.

[0002]

Solution compositions for medical use in the blood dialysis are commercially prepared by drug manufacturers in the form of stock solution compositions having a predetermined concentration. Such stock compositions are supplied to hospitals and the like having therapeutic dialysis facilities. For instance, stock solution composition, comprising the necessary components in a predetermined concentration, is filled in a 10 liters container such as polyethylene container, and commercially supplied through a commission agent to a hospital or the like having a dialysis facility. In the case of so-called "bicarbo solution compositions for the dialysis" widely used in recent years, it is necessary to prepare not only a conventional stock solution composition for the dialysis but also a concentrated bicarbo solution composition. Therefore, as far as bicarbo solution compositions are concerned, the above-mentioned two kinds of stock solution compositions are separately filled in two containers, respectively, and supplied to therapeutic dialysis facilities.

[0003]

[Problems to be solved by the Invention]

At present, conventional stock solution compositions for the dialysis are transported and supplied in the form of liquid, so that there are many problems as shown below. For instance, such conventional compositions have a liquid form, and therefore are undesirably large in their weight and volume, so that they are very inconvenient in transportation, storage and handling thereof. Furthermore, after the use of the solution compositions, many emptied polyester containers or the like remain in dialysis facilities, so that it may sometimes be difficult for the facilities to discard the emptied containers in an adequate way.

[0004]

[Means employed for solving the problems]

The present inventors have made various studies for the purpose of providing improved stock solution compositions for the dialysis, which are convenient in transportation, storage and the like thereof and can be easily formulated into preparations ready for use in the dialysis. As a result of these studies, the inventors have now found that an improved stock solution composition for the dialysis can be prepared very easily according to a method, wherein

soft bags are produced, each of which contains powder components of a stock solution composition for the dialysis and also contains a stirrer; the soft bags are transported and supplied to dialysis facilities; and, when using the powder components for the dialysis, a predetermined amount of water is supplied to the soft bag to dissolve the powder components in the water with the aid of the stirrer, whereby the aimed stock solution composition can be easily prepared. On the basis of this finding, the present invention has been completed.

(0005)

Accordingly, the invention relates preferably to a process for preparing a stock solution composition for the blood dialysis, characterized in that a predetermined amount of water is supplied to a soft bag containing powder components of the stock solution composition and having a stirrer, and

that the powder components are dissolved in the water under stirring by means of the stirrer.

The invention also relates preferably to a soft bag to be used in preparing a stock solution composition for the blood dialysis, characterized in that the soft bag contains powder components of the stock solution composition for the blood dialysis and also contains a stirrer.

[0006]

As soft bags to be employed in the invention, use may be of any soft bags for conventional medical use. Preferred examples of soft bags include soft bags made from soft polyvinyl chlorides.

Powder components of stock solution compositions to be put in soft bags may be those conventionally used in the art. For instance, when stock solution compositions for the acetate dialysis are to be prepared, soft bags are previously charged with predetermined amounts of sodium chloride, potassium chloride, calcium chloride, magnesium chloride, sodium acetate and glucose. For preparing stock bicarbo solution compositions for the dialysis, a soft bag for solution (A) is previously charged with the same powder components as those used for the acetate dialysis, and another soft bag for solution (B) is previously charged with a predetermined amount of sodium hydrogen carbonate.

[0007]

There are no specific limitations on stirrers to be put in soft bags. Preferably, use is made of stirrers coated with teflon. It is satisfactory to put one stirrer in one soft bag. The size and weight of a stirrer will be easily selected in consideration of the amount of stock solution composition to be prepared.

For instance, if 2 liters of water are to be supplied to prepare a stock solution composition, it is preferred to use a stirrer having a weight of from about 10 to 15 g and a length of from about 40 to 60 mm.

A soft bag according to the invention can be prepared in a manner, wherein a soft bag is charged with the above-mentioned powder components and provided with a stirrer, and then the soft bag is subjected to a conventional sterilization operation and thereafter to a conventional packing operation.

[0008]

When a stock solution composition is to be prepared by employing a soft bag according to the invention, the soft bag is charged with a predetermined amount of distilled water or RO-water (i.e. water produced by means of reverse osmosis), and thereafter the soft bag is placed on a stirrer-rotating machine, which is then rotated to effect a stirring and hence to dissolve the powder components in the water so as to form the aimed stock solution composition. The dissolving operation may usually be performed at room temperature, although it is also possible to effect a stirring operation at a higher temperature, for instance, of about 37°C to prepare the aimed stock solution composition in a short period of time. There

is no specific limitation on the rotation speed of stirrer, although it is preferred to rotate the stirrer at a speed of about 1,000 RPM in the case of preparing 2 liters of stock solution composition.

An embodiment of the invention is illustrated in Fig. 1. Namely, Fig. 1 shows a schematic view for illustrating an embodiment, wherein about 6 liters of water are supplied to a soft bag having a size of about 30 x 20 cm, and provided with a stirrer having a weight of 12 g and a length of 50 mm. The stirrer is rotated on a stirrer-rotating machine to prepare a stock solution composition for the dialysis.

[0009]

[Effect of the Invention]

According to the invention, soft bags are charged with powder components to be used for preparing stock solution compositions for the dialysis, and the soft bags are further provided with stirrers. Thus, the soft bags are for use in preparing stock solution compositions for the dialysis. The soft bags according to the invention are very light and have a small volume, and therefore the soft bags are convenient in transportation and storage thereof. In addition, when using the soft bags, it is very easy to prepare stock solution compositions in a short period of time.

[0010]

[Example]

The invention will be further illustrated in detail by the Example given below.

Example

Soft bags according to the invention were prepared by using either the following stock solution composition for the acetate dialysis, or the below-mentioned stock solution composition for the bicarbo dialysis, and various tests were made on these bags.

Stock solution composition for acetate dialysis
(in 100 ml)

| | |
|--|---------|
| Sodium chloride (NaCl) | 20.25 g |
| Potassium chloride (KCl) | 0.52 g |
| Calcium chloride ($\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$) | 0.65 g |
| Magnesium chloride ($\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$) | 0.53 g |
| Sodium acetate ($\text{CH}_3\text{COONa} \cdot 3\text{H}_2\text{O}$) | 15.78 g |
| Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) | 7.00 g |

Stock solution composition for bicarbo dialysis
(in 100 ml)

Solution A

| | |
|--|----------|
| Sodium chloride (NaCl) | 21.270 g |
| Potassium chloride (KCl) | 0.522 g |
| Calcium chloride ($\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$) | 0.772 g |
| Magnesium chloride ($\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$) | 0.356 g |
| Sodium acetate ($\text{CH}_3\text{COONa} \cdot 3\text{H}_2\text{O}$) | 1.720 g |
| Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) | 3.500 g |

Solution B

| | |
|--|--------|
| Sodium hydrogen carbonate (NaHCO_3) | 7.00 g |
|--|--------|

[0011]

Soft bags (30 × 15 cm), made from soft polyvinyl chloride, were individually charged with the above-mentioned powder components. Thereafter, 2000 ml of distilled water were supplied to each soft bag, and dissolution tests were made under the conditions shown below.

(I) Test on stirrers

Procedures:

Measurements were made about the time required for the complete dissolving of all the components in water, when various stirrer were used. In this test, use was made of three types of stirrers having the weight and length shown below.

(1) Weight ... 12.6 g; Length ... 50 mm

(2) Weight ... 6.6 g; Length ... 51 mm

(3) Weight ... 4.0 g; Length ... 30 mm

The temperature was 20°C, and the rotation speed of the stirrers was 500 RPM.

Results:

In the case of the stock solution composition for the acetate dialysis:

(1) 12'30"

(2) 14'00"

(3) Not completely dissolved even after 30 minutes

In the case of the stock solution composition for the bicarbo dialysis:

| | <u>Solution A</u> | <u>Solution B</u> |
|-----|---|---|
| (1) | 6'30" | 8'30" |
| (2) | 7'00" | 9'00" |
| (3) | Not completely dissolved even after 30 minutes. | Not completely dissolved even after 30 minutes. |

Therefore, it is considered that, when using the above-mentioned soft bags, the stirrers of type (1) or (2) may preferably be employed.

(II) Test concerning the rotation speed

Procedures:

Measurements were made about the time required for the complete dissolving of all the components, when the dissolving operations were

effected under stirring by means of a stirrer operated at various rotation speeds. The following three rotation speeds were employed.

- (1) 100 RPM
- (2) 500 RPM
- (3) 1000 RPM

The temperature was 20°C, and use was made of the stirrer of type (1) mentioned in Test (I).

Results:

In the case of the stock solution composition for the acetate dialysis:

- (1) Not completely dissolved even after 30 minutes.
- (2) 12'30"
- (3) 10'30"

In the case of the stock solution composition for the bicarbo dialysis:

| <u>Solution A</u> | <u>Solution B</u> |
|---|---|
| (1) Not completely dissolved even after 30 minutes. | Not completely dissolved even after 30 minutes. |
| (2) 6'30" | 8'30" |
| (3) 6'00" | 8'00" |

From the above, it will be seen that the stirrer should preferably be operated at a rotation speed of from 500 to 1000 RPM.

[0012]

(3) Test on temperature of solvent

Procedure:

Measurements were made about the time required for the complete dissolving of all the components, when the solvent, namely distilled water was supplied at various temperatures. The following two temperatures were employed in this test.

(1) 20°C

(2) 37°C

Use was made of the stirrer of type (1) mentioned in Test (I). The rotation speed of the stirrer was 500 RPM.

Results:

In the case of the stock solution composition for the acetate dialysis:

(1) 12'30"

(2) 9'00"

In the case of the stock solution composition for the bicarbo dialysis:

| | <u>Solution</u> | <u>Solution B</u> |
|-----|-----------------|-------------------|
| (1) | 6'30" | 8'30" |
| (2) | 5'00" | 2'30" |

From the above, it will be seen that the dissolving operation should preferably be carried out at a temperature of about 37°C.

(Brief Explanation of the Drawing)

Fig. 1 shows a schematic view for illustrating a manner of using a soft bag in preparing a stock solution composition for the dialysis.

The invention has above been described in connection with dialysis and with a soft bag containing a stirrer. It can, however, also be used for the preparation of other medical liquids, such as liquids intended for hemofiltration or hemodiafiltration. Furthermore, it is to be noted, that the powder components may be dissolved also without the use of a stirrer, if you provide a magnetic field which directly influence an electrolytic solution of the kind used, for instance, for dialysis. Consequently, the invention is not restricted to the above described examples, but may be varied within the scope of the following claims.

1. A process for preparing a stock solution composition for a medical treatment, such as dialysis, preferably hemodialysis, hemofiltration or hemodiafiltration, characterized in that a predetermined amount of water or a water solution is supplied to a soft bag, containing powder components of the stock solution composition, and in that the powder components are dissolved under stirring with the help of a magnetic field.

2. A process according to claim 1, characterized in that the soft bag together with the powder components is provided with a stirrer moving due to the magnetic field.

3. A soft bag to be used in preparing a stock solution composition in accordance with claim 1 or 2, characterized in that the soft bag contains powder components of the stock solution composition and has a volume large enough to contain also the necessary amount of water or water solution.

4. A soft bag according to claim 3, characterized in that it contains also a stirrer movable by means of a magnetic field.

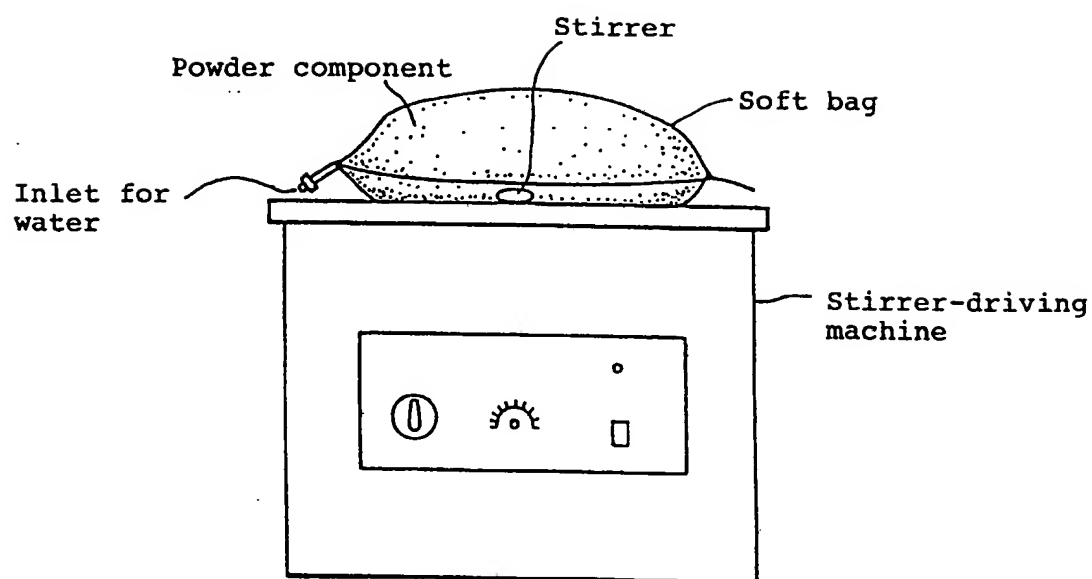


Fig. 1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 93/00191

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: A61M 1/16, A61J 1/10, A61J 1/14, B01F 13/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: A61M, A61J, B01F

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| A | US, A, 4008717 (ALLEN A. KOWARSKI), 22 February 1977 (22.02.77), column 5, line 59 - column 6, line 7, figure 8 — | 1-4 |
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| A | EP, A1, 0402611 (SPECTRUM MEDICAL INDUSTRIES), 19 December 1990 (19.12.90) — | 1-4 |

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| A | EP, A1, 0034916 (VELTMAN, PRESTON LEONARD), 2 Sept 1981 (02.09.81) ----- | 1-4 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/05/93

International application No.

PCT/SE 93/00191

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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